MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

HPB 3021 – PARALLEL COMPUTING
(All Sections/Groups)

17 MARCH 2018
2:30 – 4.30 PM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 3 pages, including this cover page.

2. You are required to attempt ALL four (4) questions. All questions carry equal marks (10).

3. Write all your answers in the Answer Booklet provided.

QUESTION 1 [10 MARKS]

a) List two features for the high performance computing.   [1 mark]

b) What is bioinformatics Linux distro? List down two bioinformatics linux distro.
[2 marks]

c) Write a bash shell script to find the biggest number from three given numbers.
Numbers are read from the keyboard and the biggest number is displayed.   [4 marks]

d) What is the function of X windows system?   [1 mark]

e) What is the advantage of top command for a multiuser environment?   [1 mark]

f) Describe the alternative command for "&".   [1 mark]

QUESTION 2 [10 MARKS]

a) A linux user observed that BLAST is not installed in the system. He applied apt-get
install command but the error message prompted as shown in the figure below.
Suggest two methods to solve the issue.   [2 marks]

```
fls-mmu@flsmmu-OptiPlex-7040:~$ apt-get install mafft
E: Could not open lock file /var/lib/dpkg/lock - open (13: Permission denied)
E: Unable to lock the administration directory (/var/lib/dpkg/), are you root?
fls-mmu@flsmmu-OptiPlex-7040:~$ []
```

b) Given a fasta formatted genome file (text file) namely "homo_sapien.fa", use
Linux command to show the number of nucleotide adenine (A) in the file and the
number of fasta sequences (>).   [2 marks]

c) What is the user from a group can do with 750 file permission?   [1 mark]

d) Write the commands to download all the genome files from NCBI ftp and list out
the downloaded file according to file sizes in ascending order .   [3 marks]
Assuming ftp link : ftp://ftp.ncbi.nlm.nih.gov/genomes/

e) Write a shell script to run multiple sequence alignments for 100 sets of data.
[2 marks]

Continued...

QUESTION 3 [10 MARKS]

a) Directory-based protocol is one of the approaches used to handle the cache coherence problem in distributed multiprocessors. Briefly explain directory protocols, with a suitable block diagram.   [5 marks]

b) Draw shuffle exchange networks with two, four and eight nodes. Make sure that you label the nodes. Is a shuffle exchange network with n nodes the same as a sub-graph of a shuffle exchange network with 2n nodes?   [5 marks]

QUESTION 4 [10 MARKS]

a.) Write a complete C program using MPI library. The program initiates ranks and size of the processors and then every processor announces its rank (e.g. prints "This is the processor 1 of 10 processors").   [4 marks]

b.) Briefly explain the following C programming commands in MPI library. Give a short description about the parameters of these functions.
   i.   int MPI_Send(void *buf, int count, MPI_Datatype dtype, int dest, int tag, MPI_Comm comm); 1pt
   ii.   int MPI_Recv(void *buf, int count, MPI_Datatype dtype, int source, int tag, MPI_Comm comm, MPI_Status *status); 1pt
   iii.   MPI_Abort (comm,errorcode);   1pt
   iv.   MPI_Probe (source,tag,comm,&status) 1pt   [4 marks]

c) What is the difference between "Asymmetric Multi-computers" and "Symmetric Multi-computers"?

                                           [2 marks]

End of paper.